



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/771,387

01/26/2001

Luis E. Zapata

IL-10792

6864

7590

02/25/2004

Alan H. Thompson  
Assistant Laboratory Counsel  
Lawrence Livermore National Laboratory  
P.O. Box 808, L-703  
Livermore, CA 94551

EXAMINER

FLORES RUIZ, DELMA R

ART UNIT

PAPER NUMBER

2828

DATE MAILED: 02/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/771,387

Applicant(s)

ZAPATA, LUIS E.

Examiner

Delma R. Flores Ruiz

Art Unit

2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 1/26/2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

  
PAUL IP  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 – 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beach et al (6,347,109) in view of O'Brein et al (5,793,521).

***Regarding claims 1, 4 – 6, 28, 30, 32 – 34,*** Beach discloses a laser apparatus, method for operating a laser and method of fabricating a laser, comprising: a solid-state laser gain medium (see Fig. 2, Character 16, Fig. 3, Character 24, Column 6, Lines 31 – 67, and Column 7, Lines 1 – 22) having a first surface and a second surface opposite to and substantially parallel with said first surface: an index-matched layer (see Figs. 2, 5, Character 22) attached to said first surface of said laser gain medium, wherein said index matched layer comprises about the same index of refraction as said laser gain medium and further comprises at least one edge (see Figs. 2 – 10, Column 3, Lines 46 – 67, and Column 4, Lines 1 – 30); an optical pumping mechanism (see Fig. 2,

Character 16, Fig. 3, Character 24, Fig. 5A, Character 52) configured to optically pump said index matched layer from said at least one edge; and a spontaneous emission reducer (SER) for reducing spontaneous emissions from said laser gain medium, wherein said SER is selected from the group consisting of at least one shaped edge on said index-matched layer, at least one shaped edge on said laser gain medium (see Figs 2 – 10, Column 1, Lines 49 – 59, Column 2, Lines 7 – 51, and Column 4, Lines 31 – 40). Beach discloses the claimed invention except for a isolation groove in said laser gain medium. It would have been obvious at the time of applicant's invention, to combine O'Brein of teaching a isolation groove in said laser gain medium with laser because the isolation groove deflect the photons traveling within the gain medium away from the transverse dimension into the index-matched layer reducing the total path-light traversed through the gain medium and a laser aperture can be increased for power scaling, thus increasing the total power delivered to the laser medium. One of ordinary skill in the art would have recognized that the method as claimed is implicitly stated over the description of the apparatus disclosed above.

**Regarding claim 2,** Beach discloses a spontaneous emission reducer reduces or eliminates amplified spontaneous emission (ASE), wherein said at least one shaped edge comprises a shape selected from the group consisting of canted, conic, parabolic and lens (see Figs 2 – 10, Abstract, Column 1, Lines 49 – 59, Column 2, Lines 7 – 51, and Column 4, Lines 31 – 40).

**Regarding claims 3, and 31,** Beach discloses a laser will produce an average power that is scaled, to first order, by increasing the transverse dimension of the gain medium while increasing the thickness of said index-matched layer proportionately (said limitation only recites facts and features that are well known and expected, the same features that essentially result from the use or application of a laser will produce an average power that is scaled, to first order, by increasing the transverse dimension of the gain medium while increasing the thickness of said index-matched layer proportionately, and therefore said limitations are said to be inherently disclosed in the teachings of Beach).

**Regarding claims 7, 8, 35, and 36,** Beach discloses at least one shaped edge comprises art angle approximately equal to  $90^\circ - \arcsin(1/n)$  and at least one shaped edge is canted at an angle of about 30 degrees with respect to said first surface (said limitation only recites facts and features that are well known and expected, the same features that essentially result from the use or application of a at least one shaped edge comprises art angle approximately equal to  $90^\circ - \arcsin(1/n)$  and at least one shaped edge is canted at an angle of about 30 degrees with respect to said first surface, and therefore said limitations are said to be inherently disclosed in the teachings of Beach).

**Regarding claim 9,** Beach discloses a laser gain medium comprises a plurality of shaped edges (see Figs 2 – 10).

**Regarding claim 10**, Beach discloses a laser gain medium comprises about 15% Yb:YAG (Column 4, Lines 22 – 55).

**Regarding claim 11**, Beach discloses a index matched layer comprises undoped YAG (Column 4, Lines 22 – 55).

**Regarding claim 12**, Beach discloses a index matched layer (see Fig. 5A Character 22) is optically pumped from two or more edges (See Fig. 5A Character 52) .

**Regarding claims 13 – 15**, Beach discloses a index matched layer comprises an index of refraction difference  $\Delta n$  with respect to the index of refraction  $n$  of said laser gain medium wherein  $\Delta n / n$  is less than or equal to  $\cos(t/s)^{-1/2}$  wherein it is the thickness of said laser gain medium and  $s$  is the longest path found across the aperture (Column 3, Lines 32, 67 and Column 4, Lines 1 – 12).

**Regarding claims 16, and 42**, Beach discloses undoped layer has a thickness that is adjusted to adequately trap the pump light, and the doped layer has a thickness and length that are adjusted to adequately absorb the pump light (Column 5, Lines 59 – 37, Column 6, Lines 1 – 67, Column 7, Lines 1 – 22 and Column 8, Lines 11 – 23).

**Regarding claims 17 and 18,** Beach discloses index-matched layer has a thickness that is adjusted to accept the amount of pump light required for the desired output power and the laser gain medium has a thickness and length that are adjusted to adequately absorb pump light while keeping the inversion density high for efficient laser extraction and the surface stress caused by heat gradients within limits (said limitation only recites facts and features that are well known and expected, the same features that essentially result from the use or application of a index-matched layer has a thickness that is adjusted to accept the amount of pump light required for the desired output power and the laser gain medium has a thickness and length that are adjusted to adequately absorb pump light while keeping the inversion density high for efficient laser extraction and the surface stress caused by heat gradients within limits , and therefore said limitations are said to be inherently disclosed in the teachings of Beach).

**Regarding claim 19,** Beach discloses a solid-state laser gain medium comprises a shape selected from the group consisting of a disk and a slab (see Figs. 2 – 10, Abstract, Column 1, Lines 63 – 67 and Column 2, Lines 1 – 50).

**Regarding claims 20, 29 and 43,** Beach discloses a cooling said laser (see Fig. 2, Character 18).

**Regarding claim 21**, Beach discloses a reflective layer (see Fig. 2, Character 14) attached to said second surface of said laser gain medium (see Fig. 2, Character 16), wherein said means for cooling (see Fig. 2, Character 18) said laser comprises a cooler attached to said reflective layer (see Figs. 2 – 10).

**Regarding claim 22**, Beach discloses a cooler comprises a high performance cooler (see Figs. 2 – 5B, Character 18, Column 3, Lines 2 – 50 and Column 4, Lines 31 – 67) .

**Regarding claim 23**, Beach discloses a reflective layer (see Fig. 2, Character 14) comprises a high reflector thin-film stack that reflects the laser wavelength at the laser beam extraction angle (Column 1, Lines 37 – 48 and Column 2, Lines 7 – 51).

**Regarding claim 24**, Beach discloses a high reflector thin-film stack comprises at least one layer selected from the group consisting of copper, gold and silver (Column 5, Lines 40 – 48).

**Regarding claims 25, and 45**, Beach discloses index matched layer comprises an anti-reflective coating designed to transmit the laser wavelength, (Column 3, Lines 32 – 54) .

**Regarding claim 26**, Beach discloses an output coupler positioned to reflect pump light and transmit light from said laser (see Figs. 2 – 10).

**Regarding claims 27 and 47**, Beach discloses a index matched layer and said laser gain medium are diffusion bonded together (see Figs. 2 – 10, Column 4, Lines 24 – 67, Column 7, Lines 50 – 67 and Column 8, Lines 1 – 10).

**Regarding claim 44**, Beach discloses a attaching a reflective layer (see Fig. 2, Character 14) to said second surface of said laser gain medium (see Fig. 2, Character 16) further comprising attaching a cooler (see Fig. 2, Character 18) to said reflective layer, wherein said cooler is used for cooling said laser.

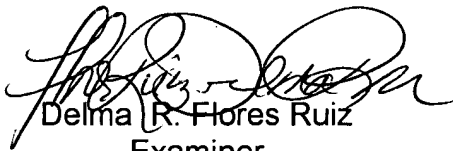
**Regarding claim 46**, Beach discloses a providing an output coupler positioned to reflect pump light and transmit light from said laser (see Figs. 2 – 10).

### **Conclusion**


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Delma R. Flores Ruiz whose telephone number is (571) 272-1940. The examiner can normally be reached on M - F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Ip can be reached on (571) -272-1941. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Delma R. Flores Ruiz  
Examiner  
Art Unit 2828



Paul Ip  
Supervisor Patent Examiner  
Art Unit 2828

DRFR/PI  
February 20, 2004